CLAIMS

What is claimed is:

1. A method for identifying an individual, comprising:

producing and storing a first biometric signature that identifies a specific individual by forming the difference between a representation of the heartbeat pattern of the specific individual and a stored representation of common features of heartbeat patterns of a plurality of individuals;

after said producing step, obtaining a representation of the heartbeat pattern of a selected individual and producing a second biometric signature by forming the difference between the heartbeat pattern of the selected individual and the stored representation of the common features of the heartbeat patterns of the plurality of individuals; and

comparing said second biometric signature with said first biometric signature to determine whether the selected individual is the specific individual.

2. The method of claim 1 wherein:

said step of producing and storing comprises producing and storing a plurality of first biometric signatures, each identifying a respective individual, by forming the difference

between a representation of the heartbeat pattern of each respective individual and the stored representation of the common features of the heartbeat patterns; and

said step of comparing is carried out with respect to each of said first biometric signatures.

3. The method of claim 2 comprising the preliminary step of obtaining representations of the heartbeat patterns of a plurality of individuals, and deriving and storing the representation of the common features of the heartbeat patterns of a plurality of individuals from at least a selected number of the representations.

4. The method of claim 3 wherein said step of deriving and storing the representation of the common features of the heartbeat patterns of a plurality of individuals comprises deriving and storing a plurality of representations of the common features of the heartbeat patterns each from a respectively different group of the plurality of individuals.

5. The method of claim 3, wherein said step of deriving and storing the representation of the common features of the heartbeat patterns of a plurality of individuals comprises

producing an average of the heartbeat patterns of the plurality of individuals.

6. The method of claim 3, wherein said step of deriving and storing the representation of the common features of the heartbeat patterns of a plurality of individuals comprises performing one of principal component analysis or wavelet decomposition.

7. The method of claim 2 wherein said step of comparing comprises correlating said second biometric signature with each of said first biometric signatures and identifying that one of said first biometric signatures that correlates most closely to said second biometric signature.

8. The method of claim 7, wherein said step of correlating comprises obtaining a correlation coefficient associated with each first biometric signature, and said step of comparing further comprises comparing the correlation coefficient associated with the identified first biometric signature with a correlation coefficient threshold.

9. The method of claim 1 wherein said step of comparing comprises: correlating said second biometric signature with

said first biometric signature to obtain a correlation coefficient; and comparing the correlation coefficient associated with the identified first biometric signature with a correlation coefficient threshold.

10. The method of claim 1 wherein said step producing and storing a first biometric signature comprises storing the signature in a local database.

11. The method of claim 1 wherein said step producing and storing a first biometric signature comprises storing the signature in a remote database.

12. The method of claim 1 wherein said step of obtaining a representation of the heartbeat pattern of a selected individual comprises compensating for deviations in the pulse rate of the selected individual from a selected pulse rate.

13. The method of claim 1 wherein said step of obtaining a representation of the heartbeat pattern of a selected individual comprises obtaining several representations of heartbeat patterns.

14. The method of claim 1 wherein said step of producing and storing a first biometric signature of a specific individual comprises obtaining a plurality of representations of the heartbeat pattern of the specific individual over a period of time and producing successive first biometric signatures each from a respective one of the plurality of representations of the heartbeat pattern of the specific individual.

15. Apparatus for identifying an individual, comprising:

 means for producing and storing a first biometric signature that identifies a specific individual by forming the difference between a representation of the heartbeat pattern of the specific individual and a stored representation of common features of the heartbeat patterns of a plurality of individuals;

 means for obtaining, after the first biometric signature has been produced and stored, a representation of the heartbeat pattern of a selected individual and producing a second biometric signature by forming the difference between the heartbeat pattern of the selected individual and the stored representation of the common features average of the heartbeat patterns of the plurality of individuals; and

 means for comparing said second biometric signature with said first biometric signature to determine whether the selected individual is the specific individual.

16. The apparatus of claim 15 wherein:

said means for producing and storing comprises means for producing and storing a plurality of first biometric signatures, each identifying a respective individual, by forming the difference between a representation of the heartbeat pattern of each respective individual and the stored representation of the common features of the heartbeat patterns; and

said means for comparing is carried out with respect to each of said first biometric signatures.

17. The apparatus of claim 16 wherein said means for producing and storing comprises means for obtaining representations of the heartbeat patterns of a plurality of individuals, and means for deriving the stored representation of the common features from at least a selected number of the representations.

18. The apparatus of claim 17 wherein said means for deriving comprises means for deriving a plurality of stored representations of the common features, each from a respectively different group.

19. The apparatus of claim 16 wherein said means for comparing comprises means for correlating said second biometric signature with each of said first biometric signatures and identifying that one of said first biometric signatures that correlates most closely to said second biometric signature.

20. The apparatus of claim 19, wherein said means for correlating comprises means for obtaining a correlation coefficient associated with each first biometric signature, and said means for comparing further comprises means for comparing the correlation coefficient associated with the identified first biometric signature with a correlation coefficient threshold.

21. The apparatus of claim 15 wherein said means for comparing comprises: means for correlating said second biometric signature with said first biometric signature to obtain a correlation coefficient; and means for comparing the correlation coefficient associated with the identified first biometric signature with a correlation coefficient threshold.

22. The apparatus of claim 15 wherein said apparatus is one of: a smart card; a passport; a driver's license apparatus; a

Bio-logon identification apparatus; a palm pilot; a cellular embedded identification apparatus; an anti-theft apparatus; an ECG monitoring apparatus, an e-banking apparatus, an e-transaction apparatus; a pet identification apparatus; a physical access apparatus; a logical access apparatus; and an apparatus combining ECG and Fingerprint monitoring.

23. The apparatus of claim 15 wherein said apparatus is a Bio-logon identification apparatus for remote logon to secure resources.

24. The apparatus of claim 15 wherein said apparatus is continuously in operation.

25. The apparatus of claim 15 wherein said means for obtaining are constructed to be contacted by either the hands or feet of the selected individual.

26. The apparatus of claim 15 wherein said apparatus is provided in a smart card that is enabled for a limited period of time after successful recognition and disabled thereafter until the next successful recognition is performed.

27. The apparatus of claim 15 wherein said apparatus is constructed to operate with encryption keys or digital signatures.

28. The apparatus of claim 15 incorporated into a watch worn on the wrist, where the signal is measured between the wrist on which the watch is worn and the other hand of the wearer.